

Application No. 09/977,019

RXSD 1014-1

In the claims:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (currently amended) A method for conducting a hearing test using a computer program, comprising:
  - establishing a communication channel between a remote device and a server in a communication network;
  - executing a first component of the computer program at the server; and
  - executing a second component of the computer program at the remote device, wherein the computer program comprises a routine that manages interaction via an interface on the remote device, and adaptively selects stimuli based upon said interaction to be produced at the remote device for said interaction according to a convergent process to determine a hearing characteristic, wherein said convergent process comprises a maximum likelihood procedure, and  
wherein said routine includes causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting a subject to make a choice by selecting a visual effect indicating the subject's perception of the stimulus during said N alternative stimulus intervals, and said convergent process comprises selecting a first stimulus and producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or ~~to cause the device to generate a~~ producing a subsequent stimulus that is increased in magnitude by a step amount if the choice in the interaction identifies an incorrect interval a number Y times, and wherein at least one of X and Y is greater than 1 during at least a part of the convergent process.
2. (original) The method of claim 1, wherein said interaction comprises an N-alternative forced choice interaction.
3. (original) The method of claim 1, wherein the communication network comprises a packet switched network.

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4. (original) The method of claim 1, wherein the communication network comprises a network executing according a standard internet protocol.

5. (original) The method of claim 1, wherein the channel comprises a connection according to a standard transmission control protocol over a standard internet protocol (TCP/IP).

6. (original) The method of claim 1, wherein the channel comprises a link through a cellular telephone network.

7. (original) The method of claim 1, wherein the channel comprises a link through a pager network.

8. (original) The method of claim 1, wherein the remote device comprises a mobile phone.

9. (original) The method of claim 1, wherein the remote device comprises a home computer.

10. (original) The method of claim 1, wherein the remote device comprises a hand held computing platform.

11. (previously presented) The method of claim 1, wherein said routine to manage interaction includes:

logic providing graphic constructs for display at the device corresponding to each of N alternative stimulus intervals.

12. (canceled)

13. (original) The method of claim 1, wherein said convergent process comprises a staircase function.

14-15. (canceled)

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16. (currently amended) A method for conducting a hearing test using a computer program, comprising:

establishing a communication channel between a remote device and a server in a communication network;

executing a first component of the computer program at the server; and

executing a second component of the computer program at the remote device, wherein the computer program comprises a routine that manages interaction via an interface on the remote device, and adaptively selects stimuli based upon said interaction to be produced at the remote device for said interaction according to a convergent process to determine a hearing characteristic,

wherein said routine includes causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting a subject to make a choice by selecting a visual effect indicating the subject's perception of the stimulus during said N alternative stimulus intervals, and said convergent process comprises selecting a first stimulus and producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a step amount if the choice in the interaction identifies an incorrect interval a number Y times, and wherein at least one of X and Y is greater than 1 during at least a part of the convergent process. The method of claim 1, wherein the number X equals 3, and the number Y equals 1.

17. (currently amended) The method of claim 1, wherein the number X equals 1, and the number Y equals 1 during an initial part of the convergent process [[test]], and wherein at least one of the number X and the number Y is changed to a value greater than 1 during a subsequent part of the convergent process [[test]].

18. (currently amended) A method for conducting a hearing test using a computer program, comprising:

establishing a communication channel between a remote device and a server in a communication network;

executing a first component of the computer program at the server; and

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executing a second component of the computer program at the remote device, wherein the computer program comprises a routine that manages interaction via an interface on the remote device, and adaptively selects stimuli based upon said interaction to be produced at the remote device for said interaction according to a convergent process to determine a hearing characteristic,

wherein said routine includes causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting a subject to make a choice by selecting a visual effect indicating the subject's perception of the stimulus during said N alternative stimulus intervals, and said convergent process comprises selecting a first stimulus and producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a step amount if the choice in the interaction identifies an incorrect interval a number Y times, and wherein at least one of X and Y is greater than 1 during at least a part of the convergent process, The method of claim 1, wherein N equals 2, and the number X equals 3, and the number Y equals 1.

19. (previously presented) The method of claim 1, wherein the N is in the range of 2 to 4.

20. (previously presented) The method of claim 1, wherein said convergent process comprises:

selecting a first stimulus in response to a basic line threshold, producing a subsequent stimulus that is reduced in magnitude by a first downward step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a first upward step amount if the choice in the interaction identifies an incorrect interval a number Y times; and

after a number A of reversals of direction of the step direction, producing a subsequent stimulus that is reduced in magnitude by a second downward step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a second upward step amount if the choice in the interaction identifies an incorrect interval a number Y times, wherein either the second downward step amount is less than the first downward step amount, or the second upward step amount is less than the first upward step amount, or both the second downward step amount is less than the first

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downward step amount, and the second upward step amount is less than the first upward step amount.

21. (canceled)

22. (currently amended) An apparatus comprising:

a data processor which executes instructions;

a communication interface coupled to the data processor; and

memory coupled to the data processor which stores instructions in a form readable by the data processor, the instructions specifying processes which establish a communication channel with a remote device via the communication interface[[]] and manage presentation of an interaction with a test subject via an interface on the remote device, and adaptively select stimuli based upon said interaction to be produced at the remote device for said interaction according to a convergent process to determine a hearing characteristic, wherein said convergent process comprises a maximum likelihood procedure, and

wherein said processes which manage presentation of said interaction include:

causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting the test subject to make a choice by selecting a visual effect indicating ~~the user's~~ perception of the stimulus during said N alternative stimulus intervals; and

said convergent process comprises selecting a first stimulus in response to a [[said]] base line threshold, producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or ~~to cause the device to generate a~~ producing a subsequent stimulus that is increased in magnitude by a step amount if the response choice in the interaction identifies an incorrect interval a number Y times, where at least one of X and Y is greater than 1 during at least a part of the convergent process.

23. (original) The apparatus of claim 22, wherein said interaction comprises an N-alternative forced choice interaction.

24. (original) The apparatus of claim 22, wherein the communication channel comprises a link via a packet switched network.

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25. (original) The apparatus of claim 22, wherein the communication channel comprises a link via a network executing according a standard internet protocol.

26. (original) The apparatus of claim 22, wherein the communication channel comprises a connection according to a standard transmission control protocol over a standard internet protocol (TCP/IP).

27. (original) The apparatus of claim 22, wherein the communication channel comprises a link through a cellular telephone network.

28. (original) The apparatus of claim 22, wherein the communication channel comprises a link through a pager network.

29. (original) The apparatus of claim 22, wherein the remote device comprises a mobile phone.

30. (original) The apparatus of claim 22, wherein the remote device comprises a home computer.

31. (original) The apparatus of claim 22, wherein the remote device comprises a hand held computing platform.

32. (previously presented) The apparatus of claim 22, wherein said processes which manage presentation of said interaction include:

logic providing graphic constructs for display at the device corresponding to each of N alternative stimulus intervals.

33. (canceled)

34. (original) The apparatus of claim 22, wherein said convergent process comprises a staircase function.

35-36. (canceled)

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37. (currently amended) An apparatus comprising:  
a data processor which executes instructions;  
a communication interface coupled to the data processor; and  
memory coupled to the data processor which stores instructions in a form readable by the  
data processor, the instructions specifying processes which establish a communication channel  
with a remote device via the communication interface and manage presentation of an interaction  
with a test subject via an interface on the remote device, and adaptively select stimuli based upon  
said interaction to be produced at the remote device for said interaction according to a  
convergent process to determine a hearing characteristic, wherein said convergent process  
comprises a maximum likelihood procedure, and  
wherein said processes which manage presentation of said interaction include:  
causing a visual effect at the device corresponding to each of N alternative stimulus  
intervals, causing generation of a selected stimulus during one of the N alternative stimulus  
intervals, and prompting the subject to make a choice by selecting a visual effect indicating  
perception of the stimulus during said N alternative stimulus intervals; and  
said convergent process comprises selecting a first stimulus in response to a base line  
threshold, producing a subsequent stimulus that is reduced in magnitude by a step amount if the  
choice in the interaction identifies a correct interval a number X times, or producing a  
subsequent stimulus that is increased in magnitude by a step amount if the choice in the  
interaction identifies an incorrect interval a number Y times, where at least one of X and Y is  
greater than 1 during at least a part of the convergent process The apparatus of claim 22, wherein  
the number X equals 3, and the number Y equals 1.

38. (previously presented) The apparatus of claim 22, wherein the number X equals 1,  
and the number Y equals 1 during an initial part of the convergent process, and wherein at least  
one of the number X and the number Y is changed to a value greater than 1 during a subsequent  
part of the convergent process.

39. (currently amended) An apparatus comprising:  
a data processor which executes instructions;  
a communication interface coupled to the data processor; and  
memory coupled to the data processor which stores instructions in a form readable by the  
data processor, the instructions specifying processes which establish a communication channel

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with a remote device via the communication interface and manage presentation of an interaction with a test subject via an interface on the remote device, and adaptively select stimuli based upon said interaction to be produced at the remote device for said interaction according to a convergent process to determine a hearing characteristic, wherein said convergent process comprises a maximum likelihood procedure, and

wherein said processes which manage presentation of said interaction include:

causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting the subject to make a choice by selecting a visual effect indicating perception of the stimulus during said N alternative stimulus intervals; and

said convergent process comprises selecting a first stimulus in response to a base line threshold, producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a step amount if the choice in the interaction identifies an incorrect interval a number Y times, where at least one of X and Y is greater than 1 during at least a part of the convergent process ~~The apparatus of claim 22, wherein N equals 2, and the number X equals 3, and the number Y equals 1.~~

40. (previously presented) The apparatus of claim 22, wherein the N is in the range of 2 to 4.

41. (currently amended) The apparatus of claim 22, wherein said convergent process comprises:

selecting a first stimulus in response to ~~[[a]]~~ said base line threshold, producing a subsequent stimulus that is reduced in magnitude by a first downward step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a first upward step amount if the choice in the interaction identifies an incorrect interval a number Y times; and

after a number A of reversals of direction of the step direction, producing a subsequent stimulus that is reduced in magnitude by a second downward step amount if the choice in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a second upward step amount if the choice in the interaction identifies an incorrect interval a number Y times, wherein either the second downward step

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amount is less than the first downward step amount, or the second upward step amount is less than the first upward step amount, or both the second downward step amount is less than the first downward step amount, and the second upward step amount is less than the first upward step amount.

42. (canceled)

43. (original) The apparatus of claim 22, wherein said processes include routines for downloading a software component to the remote device used during said interaction.

44. (previously presented) A method for remotely testing hearing using a consumer electronics device having a communication interface, an audio stimulus generator and an input, comprising:

remotely establishing a base line threshold for a control signal supplied via the communication interface causing the device to generate a sound;

remotely managing an N-alternative forced choice stimulus and response interaction to a subject; and

adaptively producing signals to induce selected stimuli at the device for said interaction according to a convergent, maximum likelihood process based upon said base line threshold and said interaction to determine a hearing characteristic.

45. (previously presented) The method of claim 44, wherein said remotely managing includes:

providing graphic constructs for display at the device corresponding to each of N alternative stimulus intervals, the graphic constructs being aligned in an up and down

relationship, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting the subject to make a choice by selecting a graphic construct using an input device indicating the subject's perception of the stimulus during said N alternative stimulus intervals.

46. (previously presented) The method of claim 44, wherein said remotely managing includes:

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causing a visual effect at the device corresponding to each of N alternative stimulus intervals, causing generation of a selected stimulus during one of the N alternative stimulus intervals, and prompting the subject to make a choice by selecting a visual effect indicating the subject's perception of the stimulus during said N alternative stimulus intervals.

47. (original) The method of claim 44, wherein said convergent process comprises a staircase function.

48. (canceled)

49. (currently amended) The method of claim 46, wherein said convergent process comprises selecting a first stimulus in response to said base line threshold, producing a subsequent stimulus that is reduced in magnitude by a step amount if the choice in the interaction identifies a correct interval a number X times, or ~~to cause the device to generate a~~ producing a subsequent stimulus that is increased in magnitude by a step amount if the choice in the interaction identifies an incorrect interval a number Y times, where at least one of X and Y is greater than 1 during at least part of the convergent, maximum likelihood process.

50. (original) The method of claim 49, wherein the number X equals 3, and the number Y equals 1.

51. (currently amended) The method of claim 49, wherein the number X equals 1, and the number Y equals 1 during an initial part of the convergent process [[test]], and wherein at least one of the number X and the number Y is changed to a value greater than 1 during a subsequent part of the convergent process [[test]].

52. (original) The method of claim 49, wherein N equals 2, and the number X equals 3, and the number Y equals 1.

53. (original) The method of claim 44, wherein the N is in the range of 2 to 4.

54. (previously presented) The method of claim 44, wherein said convergent process comprises:

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selecting a first stimulus in response to said base line threshold, producing a subsequent stimulus that is reduced in magnitude by a first downward step amount if a response in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a first upward step amount if the response in the interaction identifies an incorrect interval a number Y times; and after a number A of reversals of direction of the step direction, producing a subsequent stimulus that is reduced in magnitude by a second downward step amount if the response in the interaction identifies a correct interval a number X times, or producing a subsequent stimulus that is increased in magnitude by a second upward step amount if the response in the interaction identifies an incorrect interval a number Y times, wherein either the second downward step amount is less than the first downward step amount, or the second upward step amount is less than the first upward step amount, or both the second downward step amount is less than the first downward step amount, and the second upward step amount is less than the first upward step amount.

55. (original) The method of claim 44, wherein said remotely establishing comprises communication via a communication network.

56. (original) The method of claim 44, wherein said remotely managing comprises communication via a communication network.

57. (original) The method of claim 44, including downloading a software component from a server to the remote device which upon execution supports said method.

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